State of Washington

DRAFT

REPORT OF EXAMINATION FOR WATER RIGHT APPLICATION

File No. G2-30639
WAC Doc ID: 6129253

PRIORITY DATE	APPLICATION NUMBER
February 20, 2014	G2-30639

MAILING ADDRESS	SITE ADDRESS (IF DIFFERENT)
H&R Waterworks Inc. PO Box 1 East Olympia, 98540	The Reserve at Cooper Point

Quantity Authorized for Withdrawal or Diversion

DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
300	gpm	5.85

Purpose

PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (MM/DD)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Multiple Domestic	0	300	gpm	5.85	-	01/01-12/31

Source Location

WATERBODY	TRIBUTARY TO	COUNTY	WATER RESOURCE INVENTORY AREA
5 Wells	N/A	Thurston	13

SOURCE	WELL ID	PARCEL	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Well 1	AKH 391	70640000001	19N	2W	32	SE SW	47.08641	-122.962404
Well 2	AKH392	70640000001	19N	2W	32	NE SW	47.08841	-122.96199
Well 3	AKH 323	70640000001	19N	2W	32	NW SE	47.089678	-122.957619
Well 4	AKH 324	70640000001	19N	2W	32	SW SE	47.085981	-122.958798
Well 5	AKH 325	70640000001	19N	2W	32	SW SE	47.085915	-122.958859

Datum: WGS84

Place of Use (See Map, Attachment 1)

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

The east half of the southwest quarter and the west half of the southeast quarter of Section 32, Township 19 North, Range 2 West, W.M: Excepting therefrom county road known as Sunset Beach Road and county road known as Adams Road (Now known as 36th Avenue) and except that part lying northwesterly of county road known as Sunset Beach Road

Proposed Works

Well #	*Ecology ID#*	*Depth*	*Casing*
1	AKH 391	225	6-inch
2	AKH392	218	6-inch
3	AKH 323	198	6-inch
4	AKH 324	178	6-inch
5	AKH 325	198	6-inch

All wells are equipped with Pitless Adapters and are located outside of the pump houses which contain the distribution equipment, water is treated for iron and manganese using ATECH media systems. Meters are in place for all systems.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Started	Completed	September 1, 2021

Measurement of Water Use

- How often must water use be measured? — Monthly
- How often must water use data be reported to Ecology? — Annually (Jan 31)
- What volume should be reported? — Total Annual Volume
- What rate should be reported? — Annual Peak Rate of Withdrawal (gpm)

Provisions

Multiple Rights

Groundwater permit G2-30183 is also appurtenant to this place of use. The combined withdrawal rate from all five wells shall not exceed 300 gpm, and 23.85 ac-ft/year.

Measurements, Monitoring, Metering and Reporting

An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use," WAC 173-173, which describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements.

Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account, contact the Southwest Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Southwest Regional Office for forms to submit your water use data.

Schedule and Inspections

Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times to the project location, and to inspect at reasonable times records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I concur with the investigator that water is available from the source in question; that there will be no impairment of existing rights; that the purpose(s) of use are beneficial; and that there will be no detriment to the public interest.

Therefore, I ORDER approval of Application No. G2-30639, subject to existing rights and the provisions specified above.

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of the Order.

- File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this Order on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 **Pollution Control Hearings Board** 111 Israel RD SW STE 301 Tumwater, WA 98501	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 **Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Signed at Olympia, Washington, this _____ day of _____ 2016.

Michael J. Gallagher, Section Manager
Water Resources Program/SWRO
Department of Ecology

BACKGROUND

On February 20, 2014, Steve Harrington on behalf of H&R Water Works, Inc. filed an *Application for Water Right Permit* with the State Department of Ecology (Ecology). The application requested an instantaneous withdrawal rate (Qi) of 300 gallons per minute (gpm) and a projected annual quantity (Qa) of 12 AF/YR, to be used in conjunction with previously issued water rights. The purpose of use is multiple domestic supply of the 45-lot development known as "The Reserve at Cooper Point."

Table 1. Summary of Application No. G2-30639

Attributes	Proposed
Applicant	**H&R Water**
Application Received	February 20, 2014
Instantaneous Quantity	300 gpm (non-additive)
Source	5 Wells
Purpose of Use	Multiple Domestic Supply
Period of Use	Year-round as needed
Place of Use	The east half of the southwest quarter and the west half of the southeast quarter of Section 32, Township 19 North, Range 2 West, W.M: Excepting therefrom county road known as Sunset Beach Road and county road known as Adams Road (Now known as 36th Avenue) and except that part lying northwesterly of county road known as Sunset Beach Road

This application has been processed under Ecology's Cost Reimbursement Program. Pacific Groundwater Group (PGG) prepared this report of examination under direct contract to the applicant H&R Waterworks Inc.**, with Ecology's review.**

PGG attended a site visit and reviewed available documents pertaining to this and other related *Applications for Water Right*, including hydrogeologic and well construction reports, historical water use, surface-water conditions, and standing of existing rights.

Under the provisions of RCW 90.03.290 and 90.44, a water right may be issued upon findings that water is available for appropriation for a beneficial use, and that the appropriation will not impair existing rights or be detrimental to the public welfare. In accordance with these provisions, I recommend issuance of Permit G2-30639.

LEGAL REQUIREMENTS FOR APPLICATION PROCESSING

The following requirements must be met prior to processing a water-right application.

Public Notice

A public notice of the proposed appropriation was published in the Olympian on October 9th and 16th, 2015. No protests were received as a result of this notice.

State Environmental Policy Act (SEPA)

A groundwater right application is subject to a SEPA threshold determination (i.e., an evaluation of whether there are likely to be significant adverse environmental impacts) if one of the following conditions is met.

- It is an application for more than 2,250 gpm
- It is an application that, in combination with other water right applications for the same project, collectively exceeds the amount above
- It is a part of a larger proposal that is subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA)
- It is part of a series of exempt actions that, together, trigger the need to make a threshold determination, as defined under WAC 197-11-305

None of these situations apply to this application. Accordingly, the subject application is categorically exempt under SEPA (WAC 197-11-305 and WAC 197-11-800(4)).

Water Resources Statutes and Case Law

Under the provisions of RCW 90.03.290 and 90.44.050, a water right shall be issued upon findings that water is available for appropriation for a beneficial use and that the appropriation, as proposed in the application, will not impair existing rights or be detrimental to the public welfare.

INVESTIGATION

Evaluation of this application included, but was not limited to, research and/or review of the following:

- Drost, B. W. and others, 1998. Hydrology and quality of Groundwater in Northern Thurston County, Washington: U. S. Geological Survey Water-Resources Investigations Report 92-4109 (revised).
- Drost, B. W. and others, 1999. Conceptual Model and Numerical Simulation of the Groundwater-Flow-System in the Unconsolidated Sediments of Thurston County, Washington: U. S. Geological Survey Water-Resources Investigations Report 99-4165.
- H&R Waterworks Water System Plan 2008, *Appendix 5 Conservation Plan*
- Hall, Tammy, October 28, 2004 Department of Ecology Memorandum, Hydrogeology pertaining to Application No. G2-30183
- Natural Resource Conservation Service, 1997. *Washington Irrigation Guide, Appendix B - Washington State - West of Cascades, CIR - Crop Irrigation Requirement and CU - Crop Consumptive Use*, 14 p.
- Dougherty, D.E and D.K. Babu, 1984. *Flow to a partially penetrating well in a double-porosity reservoir*, Water Resources Research, vol. 20, no. 8, pp. 1116-1122.

- Strack, O. D. L., 1976, A single-potential solution for regional interface problems in coastal Aquifers, Water Resources Research, Vol.12, No. 6, December.
- Walsh, T. and others, 2003. *Geologic Map of the Tumwater 7.5-Minute Quadrangle, Thurston County, Washington*. Washington Division of Geology and Earth -Resources, Open File Report 2003-25.
- Washington Dept. of Health Design Manual, 2009 edition, *Appendix D: Background and Development of Residential Water Demand vs. Precipitation*
- Washington State Department of Ecology records of surface-water and groundwater rights and claims in the vicinity of the subject production wells. https://fortress.wa.gov/ecy/waterresources/map/WaterResourcesExplorer.aspx
- Washington State Department of Ecology water well logs in the vicinity of the subject production well. https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/default.aspx

A field visit was conducted on October 13, 2015 by Jill Van Hulle of PGG, with Steve Harrington of H&R Water. The tour included a review of the wells and related treatment infrastructure. All five of The Reserve wells are equipped with pitless adapters and are situated outside of the buildings that house the storage reservoirs, distribution equipment such as the pressure tanks, and the iron and manganese treatment systems. The system is fully metered and equipped with remote telemetry. In addition, H&R conduct manual meter readings when they are onsite doing water quality sampling or other maintenance.

Well 4, 5 and 3 are located on Pennant Drive. Although Wells 4 and 5 share a pump house and treatment system, they are separately plumbed and metered into the pump house. Wells 1 and 2 are situated on Jester Court. Wells 1, 2 and 3 have separate treatment systems and are housed in separate buildings.

Project Description

The intent of this application is to secure a new water-right permit for H&R's ongoing water use at The Reserve residential development.

The 160-acre project site, called The Reserve at Cooper Point, is located on Cooper Point with access from 36th Ave NW. The site is in the Sunset Beach/Green Cove area, about 3.5 miles south of the tip of the peninsula. Of the site's 160 acres, approximately 106 acres are designated as open space that is undeveloped.

Presently, 37 of the 45 lots have been developed, leaving 8 lots undeveloped. Lots at The Reserve are for the most part, large and the majority are partially wooded.

The applicant currently holds a Water Right Permit G2-30183 for the site and is not requesting an increase in the withdrawal rate (currently 300 gpm). However, the system lacks adequate annual capacity to serve all 45 lots within the project, so an additive 12 acre-feet (ac-ft) has been requested.

The Reserve at Cooper Point

The Reserve is an atypical project developed by the original property owner as five separate Group B water systems (AB267, AB268, AB269, AB270, and AB271), approved to serve a total of 45 lots in a single project. Presently each Group B water system in The Reserve has County Health approval to serve between 7 and 11 connections. The Reserve's five Group B water systems are currently owned and managed by H&R Waterworks.

Typically, projects with this many connections construct a single Group A system and qualify as a municipal water system under RCW 90.03.015(4)[1]. The multiple B configuration of these systems exempts them from water system planning and water conservation requirements that Group A systems are subject to, although H&R incorporates many of the same guidelines into its operation of its smaller system.

We note that Well 4 and 5 currently share a distribution system and are approved to supply a combined 19 connections. H&R has been advised that they should pursue a formal consolidation of these two con-joined systems, and will undertake that with their next round of water system planning updates.

Water Rights Appurtenant to the Place of Use

Withdrawals from the system are currently authorized by groundwater permit G2-30183. This right allocated 18 acre feet per year (AF/YR), which is based on Ecology's previous determination under Permit G2-30183 that approximately 360 gallons per day (gpd) per connection (average daily use) would be adequate.

Water Demand/ Quantities for Permit

The original annual allocation of 18 ac-ft under G2-30183 was intended to be sufficient to serve the entire project of 45 homes. The total demand was estimated using a formula in DOH's Water System Design Manual which calculates the average daily demand per Equivalent Residential Unit (ERU), taking into account annual rainfall in the area. The estimated water demand for the system using this method was 0.4 ac-ft per connection with equates to an average daily demand of 360 gallons a day per ERU.

In many cases 0.4 ac-ft is sufficient to supply both in-house use and provide adequate water for outdoor use during the summer. However, in the case of this system it appears that a large component of this project's higher-than-average water use stems from outside watering. Of the 45 existing homes/lots in the Reserve project 22 have lot sizes in excess of 1 acre up to 1.75 acres and 23 have lots that range between 0.58 to 0.99 acres. All homes have dedicated irrigation systems and all residents maintain irrigated turf and shrubbery landscaping.

Source meter data for 2012, 2013 and 2014 shows The Reserve systems used the full annual allocation of 18 ac-ft. The number of homes the system served ranged from 34 homes in 2012 to a high of 37 homes in 2014, although some homes were under construction and not occupied the entire period. Assuming 18 ac-ft for 34 connections, the annual water demand per connection at The Reserve is 0.53 ac-ft per year, or roughly 473 gallons a day per ERU. While usage of this rate is slightly higher than 0.4 ac-ft, allocated under G2-30183, it is still considered to be reasonable, especially since it includes the water used to back-flush the treatment system.

1

Based on a demand of 0.53 ac-ft per connection, a total of 45 lots should require **23.85** ac-ft per year. This demand also includes the approximately 2.4 acre-feet that are used for back flushing the iron and manganese treatment system, (equivalent of approximately 55 gallons per day per connections). Since the project has already been allocated 18 ac-ft, an additional 5.85 ac-ft is being authorized to meet the future needs of the development.

While water use from October to May at the Reserve is fairly typical of most systems, summer water use is higher due to outdoor water use. H&R Waterworks will need to monitor water use so the annual quantity is not exceeded.

Conservation Planning and Water Use Efficiency

The issuance of a new water right requires a finding that water will be used for beneficial purposes, and with that the assumption that water will not be wasted or used in an excessively non-efficient manner.

H&R Water currently owns 35 individual Group A Water Systems all of which have less than 500 connections. H&R also owns 85 Group B Water Systems, which are treated generally the same as the Group A's in terms of data collection, meter installation and water quality sampling. Conservation efforts for H&R systems are focused on a decrease in the peak flow rates rather than reduction of average demand. The reason for this is that HRWW's existing facilities are adequate to meet all forecasted average rates. However, the system relies to a great extent on pumping, so a reduction in peak flow rates can be of great benefit.

H&R operates its Group B systems under an Umbrella Water System Plan that includes conservation guidelines and allows for an inverted rate (conservation pricing) structure.

H&R's water conservation activities can be divided into two categories, supply side and demand side.

1. Supply-side activities are focused on better controlling and monitoring the flow of water from the wells vs. the water sold to the customer, identification of leaks in the system, and accurately monitoring the use of water from hydrants for system flushing.

2. Demand-side activities focus on decreases to peak demands, primarily in timing of lawn watering, enforcement of building codes, and conservation education for indoor and outdoor water use.

Leak Detection is conducted annually to eliminate resource waste. The Reserve water systems have a collective unaccounted-for water of 1%. This low rate is, in part, due to the configuration of the systems which serve 5 clustered developments situated within a large footprint, thus water does need to be conveyed over long distances.

The Washington Utility and Transportation Commission (WUTC) regulates H&R. Conservation rate pricing is acceptable to the WUTC providing the rate of return is reasonable and not excessive. The last price increase approved by the WUTC was October, 2005. It is a two tier slightly increasing block structure. Should other means of discouraging excessive water use not be successful H&R will pursue the establishment of a third tier of conservation pricing with WUTC.

Irrigation restrictions have been put in place on homeowners to attempt to hold consumption below the existing water right. Restrictions have included odd-even days for watering, restrictions on the number of hours of watering and the time of day in which watering is allowed.

The residences in this community are served by on-site sewage systems and there are six heavily wooded resource parcels totaling 106.42 acres (entire community subdivision is 159.7 acres) in size for wildlife habitat, pollution control, storm water retention ponds, and flood water storage; all of which contribute to groundwater recharge.

Hydrogeology

The geology and hydrogeology of the project area has been the subject of several published reports (Drost and others, 1998 and 1999; Walsh and others, 2003).

A series of glacial advances and retreats is largely responsible for the landscape in the Puget Sound topographic and structural basin. The episodic glacial and non-glacial periods are represented by layers of unconsolidated sedimentary deposits more than 2,000 feet deep in some portions of Thurston County. Unconsolidated deposits found on the Cooper Point Peninsula may be greater than 500 feet deep and generally become thicker northward toward Cooper Point.

The unconsolidated deposits may be either glacial or non-glacial in origin. The non-glacial sediments were deposited by streams on floodplains (mostly silt and clay with some organics), or in lakes fine sand to clay), and often contain reworked glacial deposits. The glacial sediments were deposited by meltwater streams (outwash) as coarse-grained valley fill (sand and gravels), or in lakes impounded by the glaciers (lacustrine sand and silt), or directly beneath the ice (till, a.k.a. hardpan). Glacial sediments tend to be sandy and gravelly, with relatively thin and discontinuous lenses of silt and clay. Tills may be gravelly and bouldery, with fine sand and matrix. Conversely, the non-glacial sediments tend to be fine sand, silt, and clay, with scattered lenses of sand and gravel. Occasional non-glacial layers are volcanic mudflows called lahars.

Walsh and others (2003) from the WA State Geologist's office conducted the most recent and thorough geologic mapping of the vicinity, so their geologic unit designations are used in this report (see Table 2, below). Other geologic units shown on Walsh's map, including Qf, Qp, Qls, Qmw, and Qgof, are not important groundwater controls in this area, so they are not discussed further in this report. The former geologic unit names, used by Drost and others (1998, 1999), are also shown in **Table 2**, below, because they may be more familiar to water-resource professionals in the region. The geologic units are listed from youngest to oldest.

Table 2. Selected Former and Current Geologic Unit Designations for Cooper Point Peninsula

Geologic Unit Name (youngest to oldest)	*Former Unit Designation (Drost and others, 1998; 1999)*	*Present Unit Designation (Walsh and others, 2003) WA State Geologist's Office*
Vashon recessional outwash	Qvr	Qgo
Vashon till	Qvt	Qgt
Vashon advance outwash	Qva, Colvos Sand	Qga, Qgas
Pre-Vashon glacio-lacustrine deposits	Qf	Qpf
Pre-Vashon sandy deposits	Kitsap	Qps
Pre-Vashon gravel and sand	Qc and TQu	Qpg

Units Qga and Qpg contain regionally extensive aquifers and serve as important domestic and municipal water sources. Units Qgt, Qpf, and Qps are regional aquitards (confining layers) that restrict the vertical movement of water between aquifers within the system, but also provide recharge to the aquifers, usually by downward leakage.

The geologic units exposed at the surface in the project vicinity are primarily Vashon recessional outwash (Qgo) and Vashon till (Qgt). The till typically underlies the outwash, but where the till occurs at the surface, the outwash was eroded away or not deposited. Unit Qgo is sometimes tapped as a low-yield source for domestic wells, but is thin and discontinuous in the project vicinity and, if present, usually is directly connected to surface waters. Unit Qgt is a regional aquitard (confining layer).

Vashon advance outwash, unit Qga, often is an important aquifer in Thurston County, but is relatively thin on the Cooper Point peninsula. Where present, it ranges in thickness from 15 to 35 feet, but locally can exceed 150 feet thick. The top of the unit generally occurs between 50 and 200 feet above sea level. At the Reserve, the Qga aquifer did not provide sufficient yield, so the wells were finished in the deeper Qpg aquifer (described below). In the project vicinity, the water-level altitude in this unit has been measured between 89 to 98 feet above sea level.

Underlying the surficial units are pre-Vashon glacio-lacustrine deposits, unit Qpf, that were deposited in a proglacial lake. This unit consists of predominately of low permeability silt, so that is behaves hydraulically as an aquitard. It ranges from 15 to 75 feet thick.

Underlying unit Qpf are pre-Vashon sandy or silty deposits associated with unit Qps. According to Walsh and others (2003), these are sand layers that are interbedded with laminated silt and minor peat, diatomite, and gravel, commonly in upward-fining sequences. Even though the unit name suggests a sandy, high permeability deposit, the unit is generally of low permeability due to the interbedded silt and peat layers. This unit has been observed to cause a prominent spring line at an elevation of about 40 ft above mean sea level along Budd Inlet. It generally overlies or is interbedded with the upper portion of unit Qpg; and is interpreted as nonglacial. Unit Qps is present above sea level along some shore areas in the project vicinity, whereas Qpg is not exposed at land surface because it lies below sea level. Qps sediments previously were referred as the Kitsap Formation and were interpreted to have been

deposited during the Olympia non-glacial interval, immediately prior to the Vashon glaciation. However, the Kitsap Formation has been shown to include much older glacial and non-glacial deposits that do not correlate with the Cooper Point sediments, so the name has been abandoned for Thurston County.

Unit Qpg is perhaps the most widely tapped aquifer in northern Thurston County. It is a confined, gravel-and-sand aquifer that occurs below sea level (Drost and others, 1998; 1999; Ecology well logs). Lateral groundwater movement at the project site in the Qpg aquifer is generally from east to west, toward Eld Inlet (Drost and others, 1999).

Water levels in the Qpg aquifer are about 40 to 60 feet lower than in the overlying Qga aquifer (Drost and others, 1999) indicating a downward vertical hydraulic gradient and downward groundwater flow. Although the two aquifers are hydraulically connected via the Qf and Qps aquitards, the aquitards significantly reduce the downward rate of flow and the effects of pumping unit Qpg on the water level in unit Qga.

Sources of Supply

The Reserve's wells are located in the south half of Section 32, Township 19N, Range 2 W.W.M. Well construction details are summarized below in Table 2.

Table 2. The Reserve - Selected Well Construction Details.

Owner's Well Number / Ecology Well ID	*Wellhead Elevation Top of (ft above msl)*	*Well Depth (ft)*	*Depth to Top of Screen (ft)*	*Elevation of Top of Screen (ft msl)*	*Depth to Static Water Level (ft)*	*Water Level Altitude (ft abv sea level)*
1 / AKH 391	171	225	215	-44	130	41
2 / AKH392	160	218	208	-48	120	40
3 / AKH 323	131	198	188	-57	100	31
4 / AKH 324	143	178	188	-45	110	33
5 / AKH 325	145	198	188	-43	110	35

Driller's logs for the project's wells indicate the source aquifer for The Reserve's wells is unit Qpg, which lies below sea level. The Reserve's water levels lie approximately between altitudes 31 to 41 feet above sea level. This is approximately the same altitudes as in three nearby wells measured by Drost and others (1999) at altitudes between 33 and 49 feet above sea level. As discussed above, the aquifer is separated from the overlying Qga aquifer by the lower permeability units Qpf and Qps.

Groundwater/Surface Water Interactions

The well sites are located in WRIA 13, Deschutes River Basin. The project site is situated between two small streams that discharge directly to Eld Inlet. Unnamed stream (WDFW number 1229730470862) to the southwest, empties into Snyder Cove. Green Cove Creek to the northeast (WDFW

#1229443470961), empties into Green Cove. Although neither stream is named in WAC 173-513, an "unnamed stream discharging to Eld Inlet" is specified and its location matches Green Cove Creek. The WAC lists a low-flow provision of 1.5 cfs on this stream. No reference is made in the WAC to a stream that empties into Snyder Cove. Both streams are utilized by Fall Chum, Coho and in the case of Green Cove Winter Steelhead, though culverts at Sunset Beach Road and Country Club Road prevent full access to these creeks.

Baseflow in the upper reaches of these streams is fed by the unconfined aquifer in unit Qgo, recessional outwash, where it is present. Baseflow in the lowest reach of Green Cove Creek may be fed by sandier layers in unit Qps (Walsh and others, 2003), which is exposed along the creek from sea level to about altitude 80 feet. The same may be true of the lowest reach of the unnamed creek flowing into Synder Cove, between sea level and about altitude 40 feet.

Based on the depth of the aquifer (PGG, 2015), head differences between the pumped aquifer and overlying units, and the groundwater-flow direction, it appears that pumping the wells at The Reserve tends to capture groundwater that would otherwise discharge to Eld Inlet from the sea-level aquifer, rather than to either creek which are fed by discharge from the shallower systems, and direct precipitation.

While this additional allocation of water is intended to meet the year-round needs of these systems, PGG notes that water use at the Reserves tends to be concentrated during the summer months when irrigation is occurring. Accordingly, for purposes of assessing the potential for impairment PGG has assumed that this additional pumping by The Reserve's wells will occur during the 6-month irrigation season. The production of an additional 6 afy[2] would require an additional 7.4 gpm of pumping. The additional pumping will be derived largely from discharge to Eld Inlet, although a small portion may come from increased leakage from overlying units.

Potential Impairment to Groundwater Users

WAC 173-150-060 specifies that only impacts to "qualifying withdrawal facilities" fit the legal definition of impairment. This definition means wells can be affected as long they are not impaired. Qualifying withdrawal facilities are wells completed in the same aquifer as the new point of withdrawal. The well must span the aquifer's entire saturated thickness, and the pump elevation must allow variation in seasonal water levels.

Testing of Reserve Production Wells

Step-rate pumping tests were conducted for Wells 1, 2, 4B, and 5, whereas a constant-rate test was conducted on Well 3. The pumping rates for the step-rate tests were increased stepwise in three to four rates. The test of Wells 4B and 5 were the longest (see Table 3, below), so the resulting data are the most suitable for interpretation of the aquifer's properties. Because Wells 4B and 5 are only a few feet apart, only the data for Well 4B were interpreted. The final specific capacities at the highest tested pumping rate in each well are shown in Table 3, below.

[2] Rounded up from 5.85 for technical review

Table 3. Selected Information From Pumping Tests of The Reserve's Wells.

Owner's Well Number	*Pumping Rate (gpm)*	*Drawdown (feet)*	*Specific Capacity (gpm per foot of drawdown)*	*Test Length (hours)*
1	76	7	11	6.5
2	83	6	14	2.5
3	95	15	6	6
4B	91	19	5	8
5	71	19	4	8

To assess the potential for increased drawdown, PGG evaluated the pump tests that had been conducted when the wells where original installed. The confined aquifer analytical model of Dougherty and Babu (1984) for a step-rate test was used to analyze the pumping test data. The assumed storativity was 0.0001, and parameter Sw was set equal to zero. The resulting calculated curve fits the data reasonably well, given the roughness of the test control (esp. pumping rate fluctuations).

Analysis of the pumping test data for Well 4b, assuming an aquifer thickness of 26 feet, resulted in the following estimates (see Figure 3):

- Transmissivity = 4,740 ft^2/d (rounded from Figure 3 value)
- Hydraulic conductivity = 182 ft/d
- K_z/K_r (ratio of vertical to horizontal permeability) = 0.001

The estimated hydraulic conductivity of 182 ft/d is about three times larger than the estimate of 59 ft/d by Drost and others (1999) for the Qpg aquifer in the project area.

The pumping test interpretation for Well 4b indicates that the Qpg aquifer behaves as a confined system with no significant short-term leakage from overlying units. Eld Inlet is sufficiently distant from the project that it exerts very little influence on pumping effects.

Analytical modeling using the confined-aquifer model of Dougherty and Babu (1984) predicts only about 0.5 feet of interference drawdown at distances greater than 100 feet from the wells, using an average pumping rate of 7.4 gpm during the 6-month irrigation season (May-October), which is a continuous pumping rate equivalent to an additional demand of 6 ac-ft.

Well records found on Ecology's website show approximately 37 wells are within 1/4 mile of The Reserve's wells. None appear to be closer than about 500 feet. Therefore, the estimated interference drawdown should be negligible and area users should be able to pump accustomed and authorized quantities of water. This small amount of interference drawdown will not impair any nearby wells, which have tens of feet of available drawdown.

Neighboring Water Right Holders

Based on a review of recorded water right document using Ecology's Explorer tool and the previous analysis by Ecology (Hall, 2004), two water right certificates and one permit have been issued by Ecology within an approximate ½ mile radius to the project site.

- Certificate G2-01037 was issued to Olympia Oil and Wood Products in April 1978 for community domestic supply in the amount of 900 gpm, and 104 acre-feet per year from a well 228 feet in depth. This well is located ½ mile north of the Reserve at Cooper Point project on waterfront property along Eld Inlet. A well report of the well indicates that it is a flowing well and likely to be drawing water from the TQu unit.

- Certificate G2-25240 issued to South Sound Utility Company in August 1983 for group domestic supply in the amount of 22 gpm and 6.5 acre-feet per year from a well 157 feet in depth. This well is located ¼ of the site, and likely completed in the Qc unit.

- Permit G2-28779 was issued to South Sound Utility in May 1996 for multiple domestic supply in the amount of 130 gpm, and 43.5 acre-feet per year from a well 157 feet in depth. This well is located approximately ¼ miles northeast of the subject property, and is likely drawing water from the Qc unit.

In addition to the above, Ecology located the following additional water rights, claims and other wells that may be located within ½ miles of the site.

- A total of 5 surface water certificates for a total of diversion of 0.3 cfs. Water use is from springs and is used mostly for single domestic supply, irrigation and fish propagation, and fire protection.

- Approximately 44 wells which appear to range in depth from 40 to 360 feet in depth and draw water from the TQu, Qc and perched zones within the Qvt.

- Approximately 46 water right claims

In its review of G2-30183 Ecology indicated that due to the geographic nature of the area, that most of the regional water use is from wells that are located near coastal discharge points or lie cross-gradient from the subject property and intercept water discharging directly to marine water. During the 2004 review Ecology indicated that impairment was unlikely to occur, which has proven accurate over the decade since the wells were brought on line.

Potential for Seawater Intrusion

Groundwater pumping at the site will be supported largely by the capture of groundwater that is flowing laterally toward Eld Inlet (Puget Sound), which is the discharge area for the west side of the Cooper Point Peninsula. Groundwater flows continuously toward, and discharges into, the sea due to the hydraulic gradient that slopes from the land to the sea.

The flow of fresh groundwater holds the denser seawater at bay, so that it can't intrude into the aquifer. The boundary between freshwater and saltwater is called the saltwater interface. Typically, the interface is located approximately beneath the shore and the freshwater wells up along the beach. Pumping a well decreases the rate of groundwater discharge into the sea by the rate of pumping. The

decrease in discharge results in a proportional landward movement of the saltwater interface into the aquifer, called seawater intrusion. To estimate how much the interface would intrude into the aquifer due to pumping the additional 6 ac-ft/yr from The Reserve's wells, the 1-dimensional analytical model of Strack (1976) was used.

The model calculation assumed that all the water was pumped from Reserve Well 4, which is closest to Eld Inlet, at a rate of 7.4 gpm, which is equivalent to pumping 6 ac-ft at a steady rate during a 6-month irrigation season. The Strack model assumed a transmissivity of 4,740 ft^2/d, storativity of 0.001, a pumping duration of 6 months, a distance from Well 4 to Eld Inlet of 2,500 feet, a head of 33 feet in Well 4, and a head of zero at sea level. The calculation indicates that the pumping will result in only a tiny landward shift of the saltwater interface by much less than a few inches. Concentrating all the additional pumping in one well that is closest to Eld Inlet is a conservative approach because the actual pumping, distributed among several Reserve wells, will cause less intrusion because the other wells are farther from the beach, so the effect will be spread out along a wider reach of the Inlet's shoreline.

Priority Processing

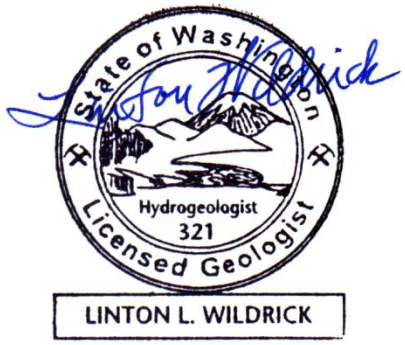
RCW 90.03.265(2) provides that, in pursuing a cost-reimbursement project, the Department must determine the source of water from which the water is proposed to be diverted or withdrawn, including the boundaries of the area that delimit the source. The Department must determine if any other water-right applications are pending from the same source. A water source may include surface water only, groundwater only, or surface and groundwater together, if the Department finds they are hydraulically connected. The Department shall consider technical information submitted by the applicant in making its determinations under this subsection.

A review of Ecology's records indicates that the only other application for new water rights that is pending on the Cooper Point Peninsula is G2-30452, which was filed by the Bonzai Water Users Association for multiple domestic supply of 22.5 gpm and 11 AF, from a well located about 2 miles southwest of The Reserve on the other side of the Cooper Point peninsula along Budd Inlet. Given the general radial seaward movement of groundwater on the peninsula, it can be assumed that the Bonzai Water Users Association's well is intercepting ground water that is discharging to the east. Given the distance between the systems and the tiny amount of additional drawdown that is expected from the continued use of the wells at the Reserve, there is no water-source conflict between this application and Bonzai's application, and that the authorization of additional water rights to H&R will not result in a diminishment of supply to Bonzai. As such, this application can be processed without the risk of impacting the outcome of other applications.

RCW 90.03.265(1)(b) provides that the requirement for an applicant to pay for the processing of senior applications does not apply in situations where the water allocated to one party will not diminish the water available to a senior applicant from the same source. Because there are no other pending groundwater applicants that will be directly affected by the requested allocation, this application can be processed prior to other pending applications.

Reported by:

Jill E Van Hulle and Linton Wildrick



Jill Van Hulle and Linton Wildrick, Pacific Groundwater Group Date

Reviewed by: _____

Tammy Hall, Water Resources Program Date

If you need this publication in an alternate format, please call Water Resources Program at 360 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

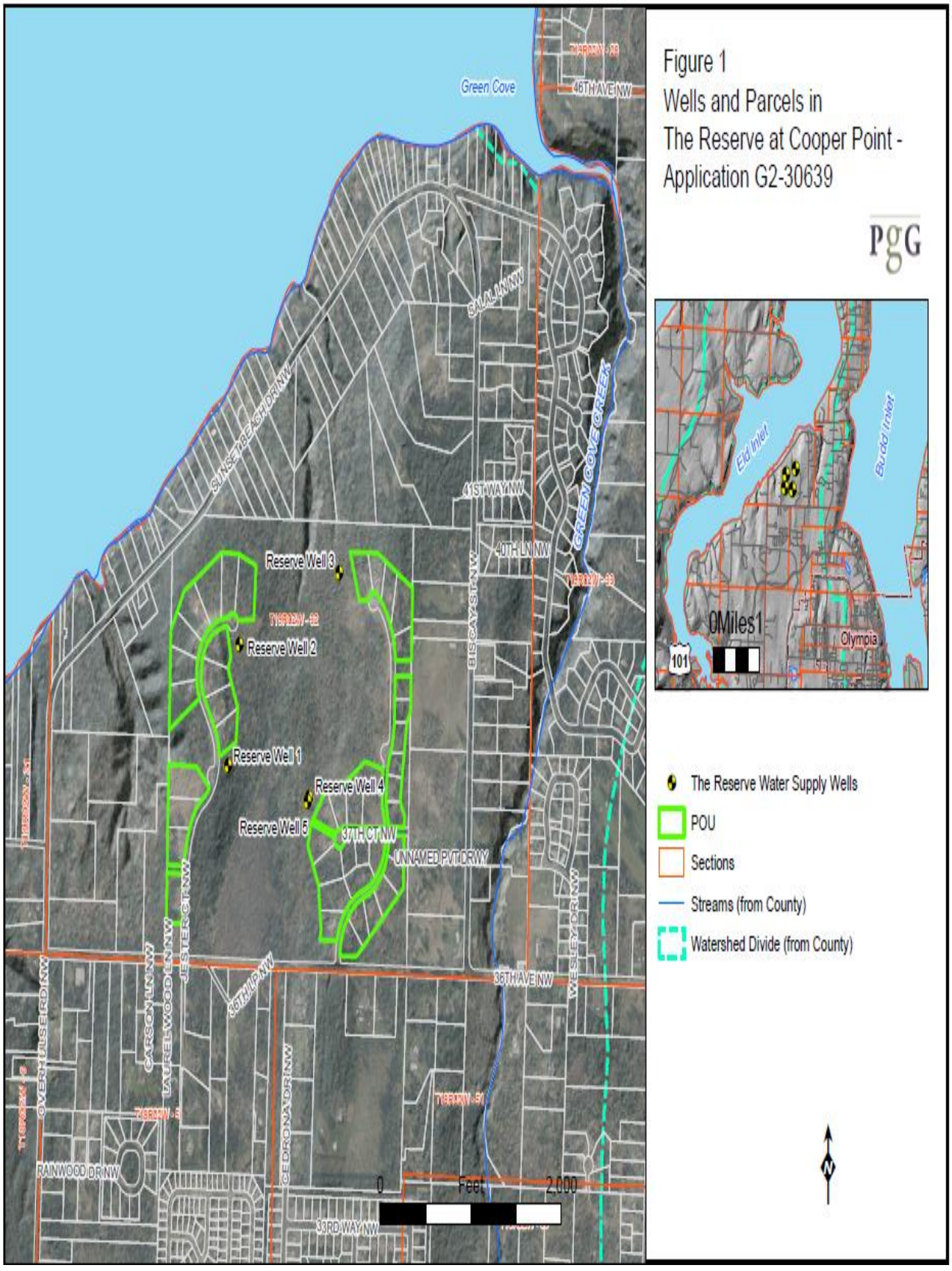


Figure 1
Wells and Parcels in
The Reserve at Cooper Point -
Application G2-30639
PgG
Green Cove
45TH AVE NW
SUNSET BEACH DR NW
41ST WAY NW
40TH LN NW
GREEN COVE CREEK
BISCAY ST NW
Reserve Well 3
Reserve Well 2
Reserve Well 1
Reserve Well 4
Reserve Well 5
37TH CT NW
UNNAMED PVT DRWY
JESTER CT NW
CARSON LN NW
LAUREL WOOD LN NW
OVERLULSE RD NW
36TH AVE NW
WESLEY DR NW
CEDRONA DR NW
RAINWOOD DR NW
33RD WAY NW
0
Feet
2,000
Eld Inlet
Budd Inlet
0Miles1
Olympia
101
The Reserve Water Supply Wells
POU
Sections
Streams (from County)
Watershed Divide (from County)
N